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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/833,953	04/11/2001	Marco Racanelli	00CON161P	3823

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EXAMINER	
MALDONADO, JULIO J	

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 04/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/833,953	RACANELLI, MARCO	
	Examiner	Art Unit	
	Julio J. Maldonado	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 March 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-12,14,15 and 17-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-12,14,15 and 17-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The cancellation of claims 13 and 25 in paper filed on 03/30/2005 is acknowledged.

2. Claims 1, 3-12, 14, 15 and 17-23 are pending in the Application.

Continued Examination Under 37 CFR 1.114

3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 03/30/2005 has been entered.

Claim Objections

4. Claim 1 and 14 are objected to because of the following informalities: claims 1 and 14 cite, "...wherein said first dose of said first dopant is significantly higher than said second dose...". However, it is not clear the metes and bounds the term "significantly higher" encompass. Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 3-12, 14, 15 and 17-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zaccherini (U.S. 5,436,177) in view of Erdeljac et al. (U.S. 5,489,547) and Shao et al. (U.S. 6,156,602).

In reference to claim 1 and 14 Zaccherini (Fig.1-6) teaches an analogous method to form semiconductor device including polysilicon resistors and transistors including forming a layer (7) comprising polycrystalline silicon over a transistor gate region (4) and a field oxide region (5) on a substrate (2, 3); forming a doping barrier (10) above said polycrystalline silicon over said field oxide region (5); doping said layer over said transistor gate region with a first dose of a first dopant (11), wherein said first dose of said first dopant (11) is a dosage greater than required to result in said layer over said transistor gate region (4) having transistor gate electrical properties, wherein said first dopant (11) has a first conductivity type; removing said doping barrier (10); and doping said layer over said transistor gate region (4) and said field oxide region (5) with a second dose of a second dopant (13) so as to form a high resistivity resistor in said layer (7) over said field oxide region (5), wherein said second dopant (13) has a second conductivity type, wherein said first dose of said first dopant is higher than said second dose of said second dose of said second dopant, and wherein said resistor and said gate transistor region (4) are formed in a doped epitaxial layer (3), which is part of said substrate (2, 3) (column 3, lines 1-53).

Zaccherini fails to teach wherein said transistor gate region being situated over a well and said field oxide region not being situated over said well. However, Erdeljac et al. (Figs.8-11) teach a method to form semiconductor devices including polysilicon

resistors and transistors formed on a substrate (10, 12, 18), wherein said substrate (10, 12, 18) includes a well region (18) and wherein said method includes forming resistors (32, 34, 56) over a field oxide region (20); forming a transistor region (44), wherein said transistor region (44) and said resistors (32, 34, 56) are formed in a doped epitaxial layer (12); and further teach forming gate electrode regions (50) over a well (18), wherein said field oxide region (20) having said resistors (32, 34, 56) formed therein is located away from said well (18) (column 5, line 10 – column 6, line 21). It would have been within the scope of one of ordinary skill in the art to combine the teachings of Zaccherini and Erdeljac et al. to enable forming the gate transistors and field oxide regions of Zaccherini on the substrate of Erdeljac et al. because one of ordinary skill in the art at the time the invention was made would have been motivated to look to alternative suitable methods of forming the gate electrodes and the field oxide regions of Zaccherini and art recognized suitability for an intended purpose has been recognized to be motivation to combine. MPEP 2144.07.

The combined teachings of Zaccherini and Erdeljac et al. fail to teach wherein the resistor region of said polycrystalline silicon layer includes an inner portion and an outer portion and further comprises the steps of forming a silicide blocking layer in said inner portion of said resistor region; doping said outer portion of said resistor region of said polycrystalline silicon layer with a third dopant so as to form a high-doped region in said resistor region, wherein said third dopant has said second conductivity type; and fabricating a contact region over said high-doped region in said outer portion of said resistor region of said polycrystalline silicon layer, wherein said contact region being

electrically connected to said resistor region. However, Shao et al. (Figs.1-7) in a related method to form implanted regions teach forming a layer (16) comprising polycrystalline silicon over a transistor gate region and a field oxide region (12); doping the field oxide region (12) having said polycrystalline silicon therein with a dopant of a first conductivity type, thus forming a resistor region (38); forming a transistor gate region (40) by patterning the polysilicon layer (16); and, in a separate doping step, forming a blocking oxide layer (60) in an inner portion of said resistor; doping an outer portion of said resistor region (38) of said polycrystalline silicon layer (16) with a dopant of said first conductivity type so as to form a high-doped region (72, 74) in said resistor region; and fabricating a contact region (column 8, lines 9 – 20) over said high-doped region (72, 74) in said resistor region (38) of said polycrystalline silicon layer (16), said contact region (72, 74) being electrically connected to said resistor region (38) (column 4, line 20 – column 8, line 42).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Zaccherini and Erdeljac et al. with the teachings of Shao et al. to enable forming high doping areas and electrical contacts in the high resistivity resistor of Zaccherini and Erdeljac et al., as taught by Shao et al., since this would result in the formation of electrical points of contact (column 8, lines 9 – 10).

The combined teachings of Zaccherini, Erdeljac et al. and Shao et al. fail to each wherein said first dose of said first dopant is higher than said second dose of said second dopant such that said transistor gate electrical properties are unaffected by said

second dose of said second dopant. However, the same materials are treated the same way and therefore the same result would be obtained. Therefore, the combination of Zaccherini, Erdeljac et al. and Shao et al. teach upon the claimed limitation.

In reference to claims 3-12, 15 and 17-23, the combined teachings of Zaccherini, Erdeljac et al. and Shao et al. teach wherein said layer comprises polysilicon (Zaccherini, column 3, lines 1 – 6); wherein said transistor region is an NFET or an PFET (Shao et al., column 5, lines 7 – 21); wherein said field oxide region comprises silicon oxide (Zaccherini, column 2, lines 53 – 61); wherein the first dopant is an N-type dopant comprising phosphorous at a dose of approximately $1x10^{15}$ to $1x10^{16}$ atoms per square centimeter (Zaccherini, column 3, lines 23 – 32); wherein the second dopant is a P-type dopant comprising boron at a dose of approximately $1.0x10^{12}$ to $1.0x10^{15}$ atoms per square centimeter (Zaccherini, column 3, lines 44 – 53); wherein said doping barrier comprises a photoresist (Zaccherini, Fig.4); wherein the polycrystalline silicon layer includes a gate region (4) (Zaccherini, column 2, lines 46 – 60); and wherein said contact region comprises a silicide (Shao et al., column 8, lines 8 – 20).

The combined teachings of Zaccherini, Erdeljac et al. and Shao et al. fail to expressly teach wherein said first dopant is doped at a dose of approximately 6.5×10^{15} atoms per square centimeter; and wherein said second dopant is doped at a dose of 1.0×10^{15} atoms per square centimeter. However, in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. MPEP 2144.05. Therefore, it would have been obvious to one of

ordinary skill in the art at the time the invention was made to use the disclosed dopant concentration disclosed in the combined teachings of Zaccherini, Erdeljac et al. and Shao et al. to arrive at the claimed invention.

Response to Arguments

7. Applicant's arguments filed 03/30/2005 have been fully considered but they are not persuasive.

Applicants argue, "...Zaccherini does not teach...where the first dose of the first dopant is significantly higher than the second dose of the second dopant such that the transistor gate electrical properties are unaffected by the second dose of the second dopant ...". In response to this argument, Zaccherini dopes the same material with the same first and second dopant at doping dosages that overlap those claimed in the invention. Therefore since the same materials are treated the same way, the same result would be obtained.

Also Applicants argue, "...the resulting structure in Erdeljac...is substantially different than the structure disclosed in Zaccherini...". In response to this argument, although the final structure of Zaccherini is different than that of Erdeljac et al., the combination is proper because the purpose of relying on Erdeljac et al. was to show that transistor regions can be formed in different areas of conductivity.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Julio J. Maldonado whose telephone number is (571) 272-1864. The examiner can normally be reached on Monday through Friday.

9. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (571) 272-1855. The fax number for this group is 703-872-9306 for before final submissions, 703-872-9306 for after final submissions and the customer service number for group 2800 is (703) 306-3329. Updates can be found at http://www.uspto.gov/web/info/2800.htm.

Julio J. Maldonado
Patent Examiner
Art Unit 2823

Julio J. Maldonado
April 13, 2005

George Fourson
Primary Examiner